10. (Amended) A sliding bearing engine according to claim 2, wherein said roughened surface is formed by shot-blasting, etching, flame-spraying or chemical treatment of a surface of grooves extending in the sliding direction.

11. A sliding bearing according to claim 1, wherein the total atomic concentration in said sublayer of said solid-dissolved Ag and Sn, said hexagonal compound, or said eutectic is at least 1.3 times higher than that of said layer nearest said backing metal.

12. A sliding bearing according to claim 2, wherein the total atomic concentration in said sublayer of solid-dissolved Ag and Sn and said additive element, said hexagonal compound, or said eutectic is at least 1.3 times higher than that of said layer nearest said backing metal.

REMARKS

Claims 1, 2, 4-7, and 9-12 are pending in the present application. Claims 1, 2, 4-7, and 9-12 are herein amended.

Rejections under 35 U.S.C. §112, first paragraph

The Examiner has rejected Claims 4 and 9 under 35 U.S.C. §112, first paragraph, because specification, while being enabling for a roughened surface having grooves made by drilling or broaching, does not reasonably provide enablement for a roughened surface having grooves made

by etching, shot blasting, etc. The Examiner asserts that the specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to practice the invention commensurate in scope with these claims. At page 14, lines 28-34 of the specification, Applicant explains that techniques for obtaining a roughened surface having groove formations are limited to certain techniques that do not encompass shot-blasting, etching, flame-spraying, or chemical treatment.

Applicants respectfully disagree with this rejection. Applicants note that the Examiner has apparently characterized limitations that do not exist in the specification. In the specification, page 14, lines 24 to 33, it is clearly disclosed that the surface of the alloy may be roughened by shot-blasting, etching, flame-spraying, groove-formation, and chemical conversion treatment. It further states that in groove-formation, which is one of the roughening methods, the grooves may be formed by means of drilling, broaching and the like.

In light of the above clarification, Applicants respectfully request that the rejection be withdrawn.

Claim Rejections under 35 U.S.C. §112, second paragraph

Claims 1, 2, 4-7, and 9-12 are rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter that Applicant regards as the invention.

Regarding claims 4-7, 9 and 10, the Examiner notes that there is no antecedent basis for the phrase "internal combustion engine".

Applicants herein amend the claims to delete this phrase.

With respect to the composition of the copper alloy, the Examiner asserts that it is unclear whether the composition is limited to the claimed ingredients of Claim 1 or may comprise additional ingredients or Claim 2.

Applicants herein amend Claim 2 to an independent form, including all the limitations of Claim 1 and adding the one or more additive elements.

In Claim 1, the Examiner asserts that it is unclear how to interpret the phrase that begins "one of: said Ag and Sn, . . . is present in a higher concentration in a portion of a sub-layer of the alloy than in the alloy nearest said backing metal." It is unclear what is the antecedent basis of the phrase "said Ag and Sn." Does this refer to solid-dissolved Ag and Sn or to secondary phase Ag and Sn?

Applicants herein amend the claim to clarify that it refers to the solid-dissolved Ag and Sn.

The Examiner further asserts it is unclear what are the species whose concentrations are being compared.

Applicants note that this comparison means the total atomic concentration of Ag and Sn, and have amended the claims to clarify this.

The Examiner further asserts it is unclear what is the significance, if any, of the word "or" preceding the phrase "a eutectic of Ag and Sn."

Applicants herein amend the claims to remove the word "or".

The Examiner further asserts it is unclear where are the locations denoted "a portion of a sub-layer of the alloy" and "the alloy nearest said backing layer." The Examiner further asserts it is unclear what defines a "portion," what defines a "sub-layer," and what defines "the alloy"?

Applicants herein amend the claims to define the terms "layer", "sublayer", and to no longer refer to "alloy nearest said backing layer".

The Examiner further asserts it is unclear with respect to the backing metal or the roughened surface, is one location necessarily closer than the other or do these designations mean something else?

Applicants herein amend the claims to define a layer of the alloy that is parallel to and adjacent to the backing metal, and a sublayer that is not directly adjacent to the backing metal.

The Examiner further asserts it is unclear what is meant by the phrase "where essentially no secondary phase of Ag or Sn is formed" and that it is unclear whether this phrase means that no secondary phase of Ag is formed *and* no secondary phase of Sn is formed **or** does whether the phrase means that no secondary phase of Ag is formed *or* no secondary phase is Sn is formed?

Applicants note that this phrase means no secondary phase of either Ag or Sn is formed. Applicants herein amend the claims to clarify this.

Regarding Claim 2, the Examiner asserts it is unclear what is meant by the phrase "where essentially no secondary phase of Ag or Sn or said at least one additive element is formed."

Applicants note that this phrase means no secondary phase of either Ag or Sn or the additive element, or any combination thereof, is formed. Applicants herein amend the claims to indicate this.

The Examiner further asserts it is unclear what is the antecedent basis of the phrase "said Ag and Sn, said hexagonal compound, or said eutectic." The Examiner further asserts it is unclear with respect to what baseline the phrase "higher concentration" is to be assessed. It is unclear where is the location denoted "a portion of a sub-layer." The Examiner further asserts it is unclear what defines a "portion," and what defines a "sub-layer"?

Applicants herein amend and clarify Claim 2 similarly as Claim 1 above.

The Examiner further asserts it is unclear whether the claimed concentration requirement of Claims 11 and 12 is further limiting of or separating from the concentration requirements of Claims 1 and 2, where reference in these claims is made to "one of said Ag and Sn, a hexagonal compound, ... is present in a higher concentration. . ."

Applicants herein amend Claims 11 and 12 to follow the amendments to Claims 1 and 2, which Applicants submit clarifies the claims and obviates this rejection.

For at least the above reasons, Applicants respectfully submit that the rejections of record have been overcome, and that the rejection should be withdrawn and the claims passed to issue.

Should the Examiner deem that any further action by Applicants would be desirable to place the application in condition for allowance, the Examiner is encouraged to telephone Applicants' undersigned attorney.

In the event that this paper is not timely filed, Applicants respectfully petition for an appropriate extension of time. The fees for such an extension or any other fees that may be due with respect to this paper may be charged to Deposit Account No. 01-2340.

Respectfully submitted,

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Attachments: Version with markings to show changes made

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Please amend the claims as follows:

1. (Twice Amended) A sliding bearing for supporting an opposing shaft movable in a sliding direction against said sliding bearing, ~~characterized in that~~ said sliding bearing comprising:

a backing metal, and

a copper alloy containing from 0.1 to 2% by weight of Ag and from 1 to 10% by weight of Sn, the balance of the alloy consisting essentially of Cu, ~~is~~ said alloy bonded to ~~a~~ said backing metal, and ~~has~~ having on its side opposite to the backing metal a roughened surface of approximately 0.5 to approximately 10 μm of roughness (Rz);

said alloy having defined a layer parallel to and adjacent to said backing metal, and a sublayer that is not directly adjacent to said backing metal;

wherein said roughened surface is coated with a coating layer comprising at least one thermo-setting resin, which is selected from the group consisting of polyimide resin, polyamide-imide resin, epoxy resin and phenol resin, and which contains from 55 to 95% by weight of MoS_2, and wherein said roughened surface is formed of grooves extending in the sliding direction;

wherein Ag and Sn are solid-dissolved in the Cu matrix of the copper alloy in at least the vicinity of said roughened surface, where essentially no secondary phase of either Ag or Sn or both is formed;

and,

wherein at least a portion of said sublayer contains one of:

~~said~~ solid-dissolved Ag and Sn,

a hexagonal compound of solid-dissolved Ag and Sn,

a hexagonal compound of Cu and solid-dissolved Ag and Sn, ~~or~~

a eutectic of solid-dissolved Ag and Sn, or

a eutectic of Cu and solid-dissolved Ag and Sn;

~~is present in a~~ in higher total atomic concentration of Ag and Sn ~~in a portion of a said sub-layer of the alloy~~ than ~~in the alloy~~ that of said layer nearest said backing metal.

2. (Twice Amended, **replaces** old claim 2) A sliding bearing for supporting an opposing shaft movable in a sliding direction against said sliding bearing, said sliding bearing comprising:

a copper alloy containing from 0.1 to 2% by weight of Ag, from 1 to 10% by weight of Sn, and 10% by weight or less of at least one additive element selected from the group consisting of Sb, In, Al, Mg and Cd, the balance of the alloy consisting essentially of Cu, said alloy bonded to a backing metal and having on its side opposite to the backing metal a roughened surface of approximately 0.5 to approximately 10 μm of roughness (Rz);

said alloy having defined a layer parallel to and adjacent to said backing metal, and a sublayer that is not directly adjacent to said backing metal;

wherein said roughened surface is coated with a coating layer comprising at least one thermo-setting resin, which is selected from the group consisting of polyimide resin, polyamide-imide resin, epoxy resin and phenol resin, and which contains from 55 to 95% by weight of MoS_2, and wherein said roughened surface is formed of grooves extending in the sliding direction;

wherein said Ag and Sn and said at least one additive element are solid-dissolved in the Cu matrix of the copper alloy in at least the vicinity of said roughened surface where essentially no secondary phase of Ag or Sn or said additive element, or a secondary phase of any combination of these, is formed;

and

wherein at least a portion of said sublayer contains:

solid-dissolved Ag and Sn and said additive element,

a hexagonal compound of solid-dissolved Ag and Sn and said additive element,

a hexagonal compound of solid-dissolved Cu and Ag and Sn and said additive element,

a eutectic of solid-dissolved Ag and Sn and said additive element, or

a eutectic of Cu and solid-dissolved Ag and Sn and said additive element;

in higher total atomic concentration of Ag and Sn and said additive element than that of said layer nearest said backing metal.

4. (Twice Amended) A sliding bearing ~~for an internal combustion engine~~ according to claim 1, wherein said roughened surface is formed by shot-blasting, etching, flame-spraying or chemical treatment.

5. (Twice Amended) A sliding bearing ~~for an internal combustion engine~~ according to claim 1, wherein said roughened surface is formed by shot-blasting, etching, flame-spraying or chemical treatment of a surface of grooves extending in the sliding direction.

6. (Twice Amended) A sliding bearing ~~for an internal combustion engine~~ according to claim 1, wherein the average particle diameter of said MoS_2 is 15 μm or less.

7. (Twice Amended) A sliding bearing ~~for an internal combustion engine~~ according to claim 1, wherein said coating layer further contains one or more of a solid lubricant, extreme pressure agent and friction adjusting agent.

9. (Amended) A sliding bearing ~~for an internal combustion engine~~ according to claim 2, wherein said roughened surface is formed by shot-blasting, etching, flame-spraying or chemical treatment.

10. (Amended) A sliding bearing ~~for an internal combustion~~ engine according to claim 2, wherein said roughened surface is formed by shot-blasting, etching, flame-spraying or chemical treatment of a surface of grooves extending in the sliding direction.

11. A sliding bearing according to claim 1, wherein the total atomic concentration in said sublayer of said solid-dissolved Ag and Sn, said hexagonal compound, or said eutectic is ~~present in a portion of the sub-layer in a concentration that is~~ at least 1.3 times higher than that of said layer ~~in the alloy~~ nearest said backing metal.

12. A sliding bearing according to claim 2, wherein the total atomic concentration in said sublayer of ~~said~~ solid-dissolved Ag and Sn and said ~~at least one~~ additive element, said hexagonal compound, or said eutectic is ~~present in a portion of the sublayer in a concentration that is~~ at least 1.3 times higher than ~~in the alloy~~ that of said layer nearest said backing metal.